Environmental Assessment

For the *Fire and Fuels Management Plan*

Approved April 2005

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INTRODUCTION

Devils Postpile National Monument, established by presidential proclamation in 1911, is managed by the National Park Service (NPS). It is approximately 800 acres in size and situated on the Middle Fork of the San Joaquin River in Madera County, California. The monument is surrounded by Inyo National Forest (map on page 2).

According to the enabling decree, the monument was established to preserve "the natural formations known as the Devils Postpile and Rainbow Falls" for their scientific interest and for public inspiration and interpretation. Devils Postpile is a dramatic mass of columnar- jointed basalt, the remnants of lava that flowed down the valley of the Middle Fork of the San Joaquin River about 100,000 years ago. Rainbow Falls is a spectacular 101- foot high waterfall on the Middle Fork San Joaquin River.

This environmental assessment (EA) was prepared in compliance with the National Environmental Policy Act of 1969 and NPS implementing regulations. Two alternatives, including a No Action Alternative, were developed and analyzed, and are included in the Alternatives Section. In accordance with NPS policy, an environmentally preferred alternative has been identified.

Alternative A – Total Suppression (No Action Alternative)
Alternative B – Suppression with Fuels Treatments (Preferred Alternative)

The EA will be made available to the public for a 30- day review and comment period. Upon completion of the public review, the NPS will assess public comments and modify the preferred alternative as necessary. A *Finding of No Significant Impact* (FONSI) would then be prepared, or the agency would begin the environmental impact statement (EIS) process.

This is a programmatic EA that analyzes the impacts of the companion draft *Fire and Fuels Management Plan* (FFMP) on the monument. Where appropriate, additional site- specific surveys would be performed prior to fuels management activity to identify and mitigate any potential environmental impacts associated with the fuels treatment. These mitigating actions would be incorporated in the treatment plan for each individual prescribed activity. Projects outside the bounds of this environmental assessment would require further environmental analysis unless covered under the Healthy Forests Initiative Act.

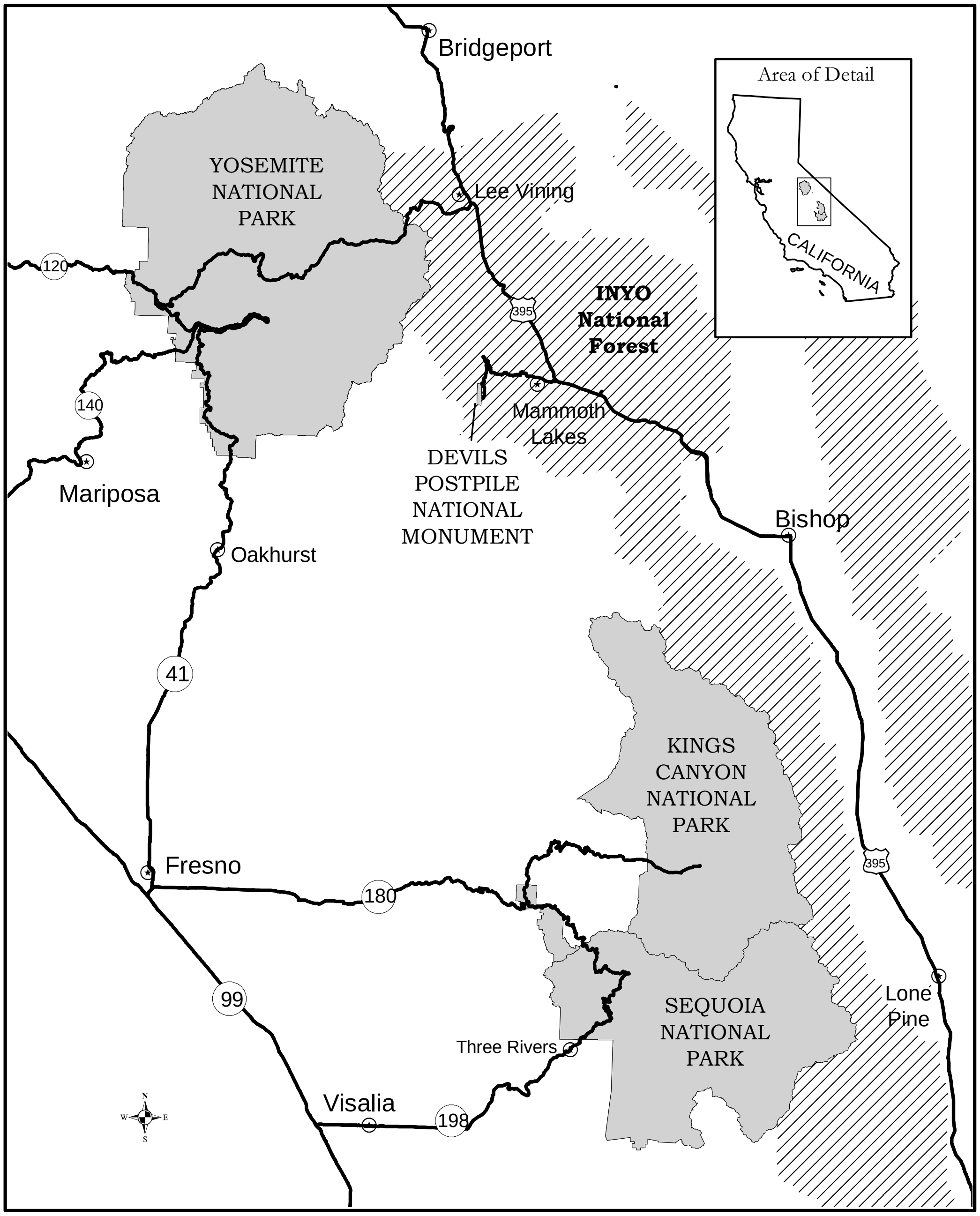

Figure 1 – Area Map: Devils Postpile National Monument, Sequoia National Park, Yosemite National Park, Inyo National Forest and major roads.

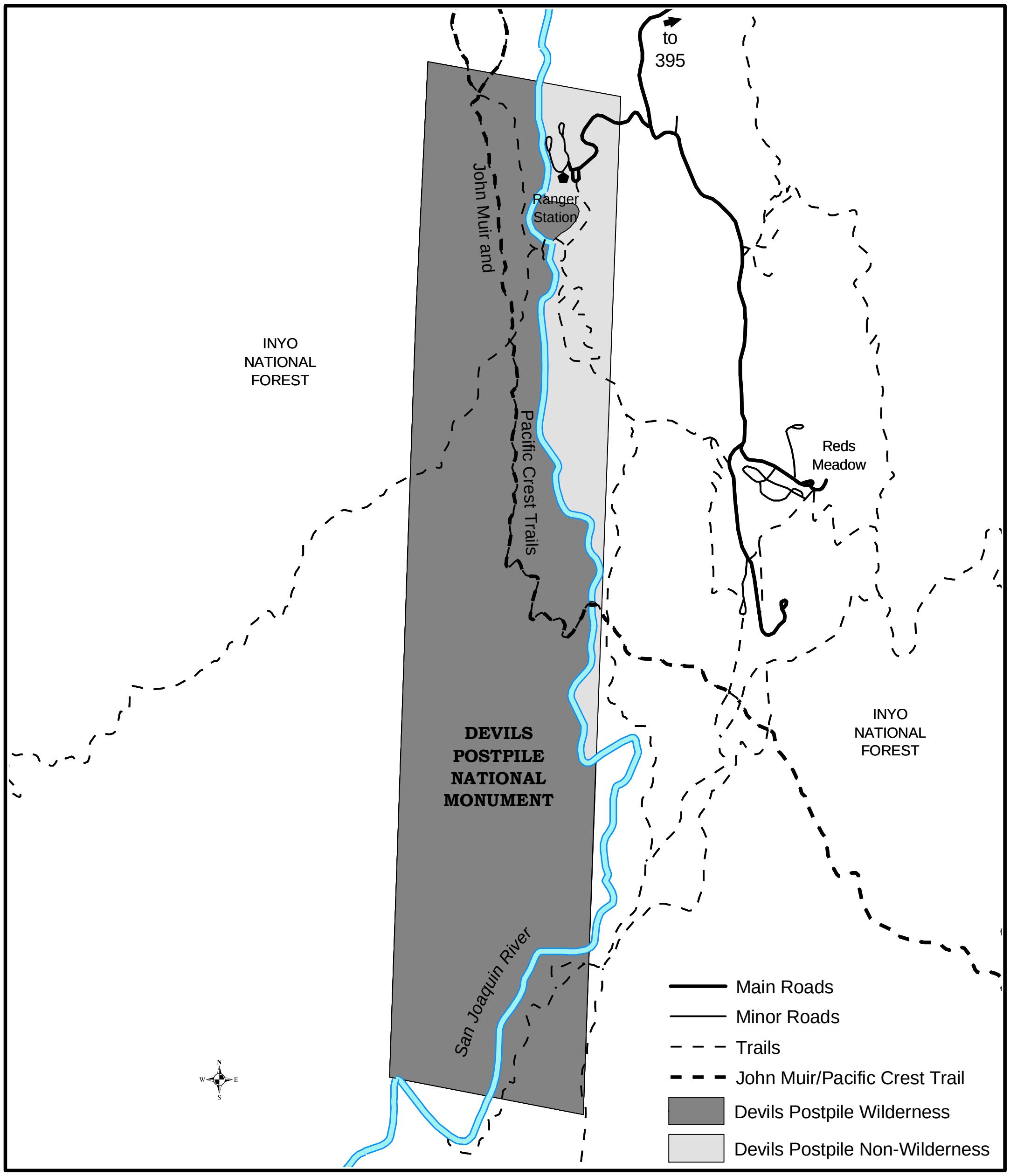

Figure 2 – Devils Postpile National Monument with Wilderness boundaries, trails, and roads.

Purpose and Need

The purpose of this EA is to consider the impacts of implementing either of two long- term fire and fuels management alternatives in Devils Postpile National Monument (hereinafter called the monument). Wildland fires have been suppressed on monument lands by federal agencies even pre- dating its establishment in 1911.

Park Service policy requires that all NPS units with vegetation that can sustain fire have an approved *Fire and Fuels Management Plan* (FFMP). All FFMPs must establish the relationships among fire management objectives, firefighter and public safety, and natural and cultural resource management objectives. Current wildland and prescribed fire management policy directs federal agencies to achieve a balance between fire suppression to protect life, property and resources, and fire use to regulate fuels and maintain healthy ecosystems. Both alternatives considered in this assessment address the goal of minimizing the threat to lives, property, cultural, and natural resources in a cost effective manner, but the goal of restoring and maintaining fire as an essential ecological process and natural change agent is not addressed by the No Action Alternative.

The 1992 Rainbow Fire burned 85% of the monument's land following an extended 80- plus-year period of fire suppression. Tree mortality in the southeast and western portions of the monument was nearly 100%. There has been poor conifer regeneration relative to regeneration in lower intensity burn areas. In the Rainbow Fire, this poor regeneration is due to the lack of a seed source from live overstory trees. A shrub and herb dominated landscape has replaced forest vegetation. This vegetation differs in relative composition and structure from that which occurred before the burn. These changes are believed to be outside of the normal range of variability that would have occurred in the area prior to the extended period of fire suppression. Of course, some past fires would have been hot, but in concentrated areas, not to the spatial extent of the Rainbow Fire. Additional fires in the Rainbow Fire area would likely kill most of the limited tree regeneration and tend to perpetuate unnatural conditions.

In other areas within the monument the Rainbow Fire burned with low intensity and severity through litter and duff, occasionally causing crown mortality. Tree mortality in these areas was much lower, and the vegetation is recovering more successfully. The unburned portions of the monument have heavy fuel loading, because of many years of successful fire suppression.

Goals for the DEPO Fire Management Program

Restore fire dependent habitats and ecological processes, while addressing fire fighter safety, protection of park resources and developments, and surrounding land uses and improvements. In order to more fully understand the role fire played in this environment, fire researchers from Sequoia and Kings Canyon National Parks are conducting a study of the fire history of the Devils Postpile area and will use the results to refine the fire management program objectives. <u>Reduce fire hazards in monument ecosystems.</u> *Fire hazard* is defined by the "resistance to control" a fire in a particular area. The attributes that affect fire behavior, and thus resistance to control, are fuel conditions, weather, and topography. Only one attribute, fuel conditions

(amount, arrangement, and continuity), can be effectively altered by management actions and therefore is the focus of most hazard fuel reduction activities.
Reduce risk of unwanted wildland fire. *Risk* is defined as the probability of new fire starts, whether by human or natural ignition. The focus of risk management in the fire program is to reduce the probability of unwanted human ignitions.

This EA analyzes the effects of suppression of unwanted ignitions, introduction of fire treatments on a limited basis, and mechanical treatments in specific areas to meet FFMP goals and objectives.

Scoping

Internal consultation with fire management and resources specialists began in March of 2004. A press release went out on April 6th, 2004 notifying the public that an FFMP and accompanying EA for Devils Postpile National Monument were being drafted. The press release was faxed to 45 cooperators, organizations, and media outlets, and emailed to an additional 400 employees, businesses, agencies, media outlets, and local residents. A public meeting was held in the neighboring community of Mammoth Lakes on May 27th to begin public scoping and no members of the public attended. Issues discussed at that meeting are incorporated into this EA.

Issues and Impact Topics

Issues and concerns affecting the proposed action were identified in March 2004 during internal consultation meetings, past NPS planning efforts, and from information given by individuals and state and federal agencies. Specific impact topics were identified based on federal law, regulations, Executive Orders, *2001 NPS Management Policies*, NPS knowledge of limited or easily impacted resources, Inyo National Forest employees, and public scoping input.

Issues and Impact Topics Selected for Detailed Analysis

The following impact topics were selected for detailed analysis:
Soils
Air Quality
Water Quality
Wildlife
Vegetation
Special Status Species
Invasive non- native plants
Wilderness Resources
Scenery and Recreation
Gateway communities

The resources which may be affected and the impacts that could occur are described in detail in the Affected Environment and Environmental Consequences sections of this document.

Impact topics dismissed from detailed analysis

Natural Soundscapes

There would be minor impacts associated with both Alternatives from the use of mechanized equipment, such as chainsaws. Natural soundscapes would be impacted during fire suppression under Alternative A, and during fire suppression, mechanized fuel removal and prescribed fire treatments under alternative B. Alternative B would probably result in more frequent less severe impacts to soundscapes than Alternative A. Overall impacts from either alternative would be negligible to minor, so impacts to natural soundscapes were dismissed.

Cultural Resources

An archeological inventory of all of the land within the monument that was practical to survey was written in 1993 (Hull and Hale 1993). The fieldwork was conducted in late 1992, shortly after the Rainbow Fire swept through approximately 85 percent of the monument's acreage. Surface visibility was optimal. Nine sites were re- visited or newly recorded. The recommendations made in the report remain pertinent for any proposed undertaking, including prescribed fire. These recommendations include four basic components: 1) collections study, 2) literature search, 3) site evaluation, and 4) research. Project- specific compliance would be conducted for each prescribed fire, with an emphasis on identifying ground- disturbing activities such as those associated with staging areas and the cutting of fireline. The Cultural Resources Specialist for Sequoia and Kings Canyon National Parks remains the key contact for Devils Postpile National Monument cultural resources concerns.

Archeological resources are not addressed as an impact topic in this environmental assessment because no impacts to archeological resources are expected from either alternative. The archeological resources in the monument have been located and documented and fire managers would be required to consult with the cultural resources specialist prior to implementing any ground disturbing activities.

If any new, unrecorded archeological resources are uncovered during non- emergency fire operations, all work would immediately cease in the discovery area and the cultural resources specialist would be consulted.

No structures in the monument are eligible for the National Register.

Other Impact topics

The following topics were also dismissed, because there would be no measurable impacts to these resources from either alternative: Geology, Cultural Landscapes, Historic Structures and Districts, Ethnographic Resources, Sacred Sites, Indian Trust Resources, Museum Objects, Socioeconomic Resources, Prime and Unique Farmland, Land Use, Environmental Justice, Wild and Scenic Rivers and Night Skies.

ALTERNATIVES

Under both alternatives considered here, initial attack suppression actions would be taken on all human caused wildland fires and escaped prescribed fires. Initial attack suppression actions would provide for public and firefighter safety, protect public and private resources, and utilize techniques that would cause the least impact to the monument's natural resources. Inyo National Forest would provide initial attack response. Sequoia and Kings Canyon National Parks would provide additional oversight for extended attack operations.

Throughout the monument, the use of suppression resources would be constrained as follows.

- Fire engines and other vehicles would not be driven off established roads.
- Use of heavy, earth- moving equipment anywhere in the Monument is not authorized, and requests to use such equipment would require special approval by the monument's superintendent.
- Minimum Impact Suppression Techniques (MIST) would be applied for all fire suppression and prescribed fire actions in the wilderness (Appendix D of the companion *Fire and Fuels Management Plan*). Any non- emergency actions, such as prescribed fire and mechanical fuel treatments, which are performed in wilderness, will undergo a thorough Minimum Tool analysis to ensure that the effects of motorized equipment and aircraft landing on wilderness character are minimized. This will be completed prior to final decision.
- Firelines would not be constructed directly through meadows or riparian areas.
- Chemical fire retardant will be used sparingly and with maximum regard for aquatic life.

Alternative A – Total Suppression (No Action Alternative)

Under this alternative no changes from current procedures would be implemented. All wildland fires would be suppressed using appropriate management techniques. Fire suppression personnel would, in a cost- effective manner, seek to limit the spread of all fires as quickly as possible, ensure public and firefighter safety, protect the monument's natural and cultural resources, and protect other private and public property.

In many cases, an appropriate management technique would entail the deployment of firefighters with hand tools and engines to control the fire as quickly as possible. Aircraft could be used to put water or fire retardant on the fire from above. Another technique that could also be used is indirect attack, where suppression forces burn out fuels in advance of the fire, using existing roads and trails as control lines. In the event of inadequate staffing or more than one fire, the highest priority would be given to the fire, or portions of the fire, that have the most potential to adversely affect human life or safety, or to spread onto private or other public lands outside the boundaries of the monument or into developed sites within monument boundaries. Removal of hazardous fuel accumulations by the use of mechanical treatments, prescribed fire, and natural ignitions would not occur under this alternative.

Alternative B – Suppression with Fuels Treatments

Under this alternative, the monument would suppress all unplanned ignitions and use fuels treatments (mechanical and prescribed fire) to achieve resource objectives and reduce fuel loading. Unplanned ignitions would be suppressed using appropriate management techniques, with the same control objectives described in Alternative A. Prescribed fire would be used to reduce accumulations of hazard fuel, and restore fire dependent habitats and ecological processes. Mechanical treatments would be applied in developed areas of the monument.

A prescribed fire would only be ignited if a burn plan was approved and signed, all the conditions of the burn plan were met, and on- site conditions were within prescriptive parameters. A prescription includes measurable criteria including fuel moisture, relative humidity, wind speed and current and forecasted fire weather. Burn plans also specify holding and contingency forces, ignition sequence, desired fire behavior characteristics, air quality, public health considerations, and measures to be taken to reduce the impacts of the operation. Pre- burn and post- burn monitoring would be used to determine if treatment objectives were being met.

Mechanical techniques would be used to reduce hazardous accumulations of fuels around structures and developed areas to decrease the likelihood fire damage to monument infrastructure. A prescription for vegetation removal would be in effect for each mechanical treatment. Mechanical treatments would require follow up fuels reduction treatment, most often prescribed fire but could also include chipping of unwanted woody material.

Current training and experience levels of park staff would allow the park to treat approximately 55 acres over the next five years. During that period of time, fire management staff may identify additional units for treatment. A list of existing or proposed treatment units can be found in Appendix A of the companion *Fire and Fuels Management Plan*.

Fire monitoring plots established after the 1992 Rainbow Fire would continue to be monitored according to the protocols used by Sequoia and Kings Canyon National Parks. New plots would be established in treatment units prior to implementation of work. Monitoring results would be used to fine- tune prescriptions, as necessary, to ensure resource management objectives were achieved.

Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that “the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA Section 101. The environmentally preferred alternative would:

“1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2. assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

Alternative A, which calls for the suppression of all wildland fires, fails to conform to the policies outlined above. Full suppression measures leads to unhealthy ecosystems and catastrophic fires, like the Rainbow Fire which burned in the monument and surrounding National Forest in 1992.

Alternative B is the environmentally preferred alternative because it more closely conforms to policies 1- 6. The current vegetation composition and distribution and abundance of fuel in the monument are unnatural (see affected environment). Fuels treatments can be used to help restore monument ecosystems and re- establish a more natural fire regime and vegetation. This would protect natural resources for future generations and help protect the surrounding areas from catastrophic fires. Implementation of fuels treatments would also better protect human infrastructure from unwanted fire.

Alternatives Considered and Dismissed

Management of Some Lightning-Caused Fires

Under this alternative, human- caused wildland fires would be suppressed using appropriate management techniques with the same control objectives described in Alternative A. Prescribed fire and mechanical hazard fuel reduction would be used as outlined in Alternative B to reduce the likelihood of any adverse impacts of wildland fire on monument resources or the spreading of such fires onto other public and private lands.

The major difference between this alternative and Alternative B is that lightning- caused wildland fires which occur in the monument could be managed as fire use projects to benefit natural resources. Fires that meet predetermined control objectives would be allowed to burn within current and predicted weather constraints. The fire would be used to meet established resource objectives in a predetermined area. Lightning- caused wildland fires outside the prescriptive constraints would be suppressed, as in Alternatives A and B.

In 1992, the Rainbow Fire severely burned a large portion of the monument. Tree mortality in the area burned was high and the vegetation structure and composition was converted to an herbaceous/shrub stage, which is unnatural with respect to this forest vegetation type over that large of an area. Additional fire within the Rainbow Fire area would perpetuate this unnatural vegetative phase. It is more desirable that the area goes without fire for a period of time commensurate with this environmental analysis to allow vegetation recovery.

This Alternative was rejected because the results are likely to have adverse effects on vegetation recovery within the Rainbow Fire perimeter and resource objectives would not be met. However, fire managers would consider fire use as a management tool in future environmental compliance and fire planning documents for the monument. After this current plan expires in 5-10 years, fire managers and ecologists can reassess the Rainbow Fire area and determine if natural fire would be a positive addition to the list of management strategies. Decades of fire suppression created the conditions that allowed the Rainbow Fire to burn so severely. For at least the next decade or more, fire suppression is necessary to promote tree regeneration before a natural fire regime can resume.

AFFECTED ENVIRONMENT

Location and General Description

Devils Postpile National Monument is located in California's central Sierra Nevada on the eastern edge of Madera County near Mammoth Lakes, about 80 miles north of Sequoia and Kings Canyon National Parks (see maps on pages 2 and 3). The monument is on the west slope of the Sierra, but the only road access is from the east side of the Sierra. The monument is a 2.5 by 0.5 mile oblique rectangle along the Middle Fork of the San Joaquin River which encompasses the Devils Postpile and Rainbow Falls.

Devils Postpile is one of the world's finest columnar basalt formations, and Rainbow Falls is where the Middle Fork of the San Joaquin dramatically plunges 101 feet over a cliff of basalt. The monument is in a geologically active area west of the Long Valley Caldera and southeast of the Mono Craters. Due to snowy conditions at its 7,600- foot elevation, the monument is open to the public only between June and October. The monument operates under the general administration and management of Sequoia and Kings Canyon National Parks, but it is a distinct National Park Service unit with its own superintendent.

Resources

Soils

The monument is underlain by granitic bedrock, which dominates a significant portion of the Sierra Nevada. Other major geologic units in the monument include the andesite of Mammoth Pass, the rhyodacite of Rainbow Falls, and the basalt of the Buttresses (Huber and Eckhardt 1999). The soils are mostly sandy with a thin surface- layer of loose pumice, but in the meadows, there is some development of organic material. When these soils are not protected by vegetation or duff they erode rapidly. Actual rates of erosion would vary, even over relatively short distances, due to differences in slope steepness, length, and aspect as well as minor differences in soil structure, and the extent and structure of surface cover (Luce and Black 2001).

Air Quality

The monument's location in Madera County makes it part of California's San Joaquin Valley Unified Air Pollution Control District (hereafter referred to as the Air District). The Air District is in non- attainment status for PM_{10}, severe non- attainment for ozone (8hr), and extreme non-attainment for ozone (1hr). The Clean Air Act states federal land managers have an affirmative responsibility to protect the air quality- related values of NPS units, including visibility, plants, animals, soils, water quality, and visitor health from adverse air pollution impacts. The monument is no exception.

Air quality in the monument is protected under several provisions of the Clean Air Act (CAA), including the National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) Program. One of the goals of the PSD Program is to preserve, protect, and enhance the air quality in areas of special natural, recreational, scenic, or historic value. Located at 7,600 feet in elevation, at the upper reaches of the Middle Fork of the San Joaquin River, air pollution in the monument is not as severe as in other portions of the Air District. No research has been done to determine if pollution from the Central Valley, or particulates from the dry surface of Owens Lake in the Owens Valley, directly affect air quality in the monument. Limited monitoring of air quality has been done outside the monument boundary. Nevertheless, the monitoring observations are useful in characterizing pollutant levels in the monument. The data infer that some pollution, including pesticides, ozone and particulates, are transported into the monument from outside sources on some days. A 1998 air emissions inventory for the monument found that current emissions in the monument are negligible (1998 Air Emissions Inventory Devils Postpile National Monument).

Water Quality

Water Quality in the San Joaquin River meets or exceeds California state standards for the following beneficial uses: wildlife habitat, freshwater habitat, contact and non- contact recreation, agriculture, and municipal and domestic water supply (California Regional Water Quality Control Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins 4th Edition 1998).

Recreational activities such as horseback riding, swimming, and hiking can lead to the introduction of organic, physical, and chemical pollutants into aquatic systems. Water quality at the monument may also be affected by human and animal waste and may contain parasites such as *Giardia lamblia*, which causes giardiasis.

Vegetation

Though small in size, the monument is diverse enough in its topography and geology to support a number of different plant communities. Plant species characteristic of both the wetter western and drier eastern slopes of the Sierra Nevada are present in the monument because of its close proximity to the Sierra Crest. The dominant mixed coniferous forest gives way to a riparian zone along the river, and in other places to small meadows, seeps and sag ponds. Fire has played an integral role in the development and maintenance of most vegetation communities in the Sierra. Sequoia, Kings Canyon and Yosemite National Parks' mid- elevation coniferous forests on the west slope of the Sierra have been subject to frequent lightning- ignited fires. Pre-Euroamerican fire frequency was related to elevation, aspect and vegetation type with frequent fires (6- 17 yr. fire return interval) in lower mixed- conifer forests declining with increasing elevation (Caprio & Swetnam 1995, Swetnam et al. 1998, Caprio 2004).

A survey of the vascular plants of the monument was conducted in 2001 (Arnett and Haultain 2004). An association- level vegetation map of the monument, based on 1997 color infrared aerial photography, is in preparation. Because of the monument's close proximity to Yosemite National Park this is part of a larger effort to map the vegetation of Yosemite National Park and environs. Current research on differential vegetation response to season of burn is being done in Sequoia National Park, and across the nation. Results from these initiatives would be used to improve the fire management program.

Forests – Lodgepole pine is the dominant conifer species in cool, moist sites, such as those along the river's edge, and is replaced by white fir, red fir and Jeffery pine on drier slopes. Western white pine, hemlock and white- bark pine generally grow at the higher elevations of the monument, and western juniper grows on rock outcroppings and in xeric, exposed sites. The understory of these coniferous forests is relatively sparse on mid- to high- angle slopes, with hawkweed, western needlegrass, ross's sedge, tibinagua, coyote mint, wire lettuce, phacelia and gayophytum being the most abundant herbs. Dry, sunny forest openings support small patches of chaparral consisting of mountain whitethorn, manzanita, currants, gooseberries, and huckleberry oak. Sunny openings also support numerous large stands of bracken fern in both moist and dry drainage bottoms. A single significantly sized stand of aspen occurs in the monument.

Meadows – On low- angle slopes and in drainage bottoms, accumulated moisture allows montane meadow vegetation to flourish. Two such meadows are found along the river in the monument, where they provide important habitat for wildlife. Common plant species found in the meadows include shooting star, Horkelia, lilies, false Salomon's seal, scouring rush, lupine, monkey flower, clover, grasses and sedges.

Seeps and Small Ponds – Seep vegetation contributes significantly to the diversity of the monument's flora. Characterized by high amounts of soil moisture, the seeps support micro-communities that consist of monkey flower, clover, rock star, hair grass, tinker's penny, phlox and knotweed. Some small ponds occur in the monument. They augment the diversity of habitats by establishing aquatic systems within the otherwise dry surroundings.

Riparian – Alder, willow and American dogwood are the dominant woody species along the banks of the Middle Fork of the San Joaquin River. Black cottonwoods occasionally occur on the banks; however they are not a major component of the flora. Fireweed, ranger's buttons, sneezeweed and arnica are commonly found along the banks of the river. Intermittent riparian habitats are common in the monument and support species such as monkey flower, wild onion, death camas and sedges.

Fire Regime

Fire history studies, based on tree- ring studies of fire- scarred trees in the Sierra Nevada, show that most vegetation communities were, to some extent, influenced by fire. Fires may have been frequent in some plant communities, with return intervals of 3- 5 years, or rare and episodic in others. Since the late 19th century, institutionalized fire suppression has, in many instances and locations, succeeded in eliminating fire as a natural process in Sierran ecosystems. Consequently, plant species that require fire for survival or regeneration and vegetation communities where community structure and species composition are mediated by fire have experienced an unprecedented period without fire (Caprio and Graber, 2000). This change in the fire regime has resulted in important, and often quite drastic, ecosystem changes. Stands of mixed- conifer forests have become denser in many areas and the dominance of shade- tolerant species has increased. Shrubs and herbaceous plants are probably less abundant in the understory than in the past (Kilgore and Biswell 1971, Harvey et al. 1980). Perhaps most importantly, dead biomass has accumulated, causing an unprecedented buildup of surface fuels (Agee et al. 1978, van Wagtendonk 1985). "Ladder fuels" capable of conducting fire into the crowns of mature trees have also increased (Kilgore and Sando 1975, Parsons and DeBenedetti 1979). An immediate consequence of these changes is that wildfires sweep through the mixed conifer forests with a severity that was rarely encountered in pre- Euroamerican times (Kilgore and Sando 1975, Stephens 1995, 1998).

The 1992 Rainbow Fire that burned about 85% of Devils Postpile N.M. is a classic example of a high severity fire that would have been highly infrequent under a natural fire regime. The Rainbow Fire will have a long- term influence on vegetation dynamics in the affected portion of the monument. Preliminary data from a fire history study in the monument (Caprio 2004, Caprio unpublished data) indicates that historically, lower elevation areas of mixed- conifer (dominated by Jeffrey pine, red firs, and white fir) experienced repeated fires each century. Preliminary analysis from fire history sampling in the monument area indicates that up to fifteen fires occurred between the years of 1700 and 1880. More northerly and higher elevation areas of the monument historically experienced fire less frequently or very rarely. In areas where fires were historically rare, forest species composition was comprised of lodgepole pine, red fir, western white pine and mountain hemlock. This pre- Euroamerican historical variation appears to be the result of topographic barriers to fire spread up the San Joaquin River drainage and changes in vegetation and fuel with elevation.

Wildlife

Common small mammals within the monument include deer mice, long- tailed voles, golden-mantled ground squirrels, lodgepole chipmunks, chickarees, and Belding ground squirrels. Large colonies of Belding ground squirrels are found in Soda Springs Meadow during spring and summer months. Other mammals occasionally sighted include porcupines, coyotes, long-tailed weasels, martens, and marmots.

Mule deer and black bear are the most prevalent large mammals in the monument. Mule deer are often sighted in Soda Springs Meadow in the evening and early morning hours. Black bears are occasionally seen in the monument but more frequently observed in the nearby Inyo National Forest.

Common birds in the monument include Steller's jay, western tanager, dark- eyed junco, and hairy woodpecker. Goshawks and great horned owls are often observed in late summer.

Because of the cool, montane climate, there are few species of reptiles and amphibians in the monument. Those most commonly encountered include the pacific tree frog, northern alligator lizard, and western terrestrial garter snake.

The fish fauna of the San Joaquin River and its tributaries include rainbow, brown, golden, and brook trout. None of the fish are native to the area, but all of the fish are "wild" in the sense that they have not been stocked and are the product of in- stream reproduction. The river is formally designated a "Wild Trout" stream by California Department of Fish and Game

On a regional level, lack of fire has reduced habitat necessary for certain wildlife species. In the absence of fire, the number and extent of forest openings is reduced, with an accompanying reduction of key herbaceous and shrub species (particularly nitrogen fixers such as *Ceanothus*) (Bonnicksen and Stone, 1982). Wildlife, such as deer, that depends on these plants has less available habitat. Black- backed woodpeckers probably declined in the absence of fresh fire-created snags. The effects of fire exclusion can extend to higher trophic levels. For example, rodents are less abundant in areas where fire has been excluded (Werner, 1997), potentially leading to a reduction in the carnivore and raptor populations that depend on them. The burned portion of the monument provides important habitat for these animals. Rodents are abundant in the area and many black backed woodpeckers have been seen there in recent years.

Special Status Species

Federally and state- listed endangered, threatened, and rare flora and fauna have been inventoried by the U.S. Fish and Wildlife Service. Law and NPS policy require special consideration and protection.

Plants – There are no federally listed plant species that are known to occur in the monument. There are three species cited in the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (2001) that were documented in the 2001 floristic inventory.

Hulsea brevifolia (Asteraceae) is documented from five collections in the monument. This taxon is on CNPS List 1B (plants rare, threatened or endangered in California and elsewhere). H. brevifolia is currently quite common in volcanic substrates in the post- fire region of the monument.

Cinna bolanderi (Poaceae) is known from Fresno, Mariposa, and Tulare Counties. There is one documented collection from a moist SSW- facing spring- fed drainage surrounded by Jeffrey pine/red fir forest. This plant is on the CNPS watch list (plants of limited distribution or infrequent throughout a broader area in California, and whose vulnerability or susceptibility to threat appears low at this time).

Mimulus laciniatus (Scrophulariaceae) is documented from two collections in the monument. This taxon is on the CNPS watch list. Collections of this plant were made from seeps on granite, which is in accordance with the habitat given in Hickman (1993).

Animals – The bald eagle is the only federally listed threatened species that has been sighted in the Monument, and there is only one record of its occurrence. Species listed by the state of California include the willow flycatcher and great grey owl, none of which frequent the Monument. Other species of concern include many of the bats that occur in the monument (spotted bat, western mastiff bat, Yuma bat, Long- eared myotis, and long- legged myotis), American martin, California spotted owl, long- eared owl, goshawk, Cooper's hawk, golden eagle, black swift, hermit warbler, yellow warbler, and osprey.

A complete listing of federally and state listed threatened and endangered species that could occur in, or be affected by, activities in the monument area was provided by the U.S. Fish and Wildlife Service on August 4, 2004 and can be found in park files regarding this environmental assessment (Addendum).

Invasive Non-Native Plants

The state of California and the federal government both list some aggressively invasive plants, which were originally native to a different part of the world, as noxious weeds. Listed noxious weeds are typically those which have a significant adverse impact on agriculture or the nation's economy. There are no listed noxious weeds that are known to occur in the monument. Not all exotic species, however, are aggressively invasive and can establish populations that may out-compete native plant species, are listed as noxious weeds. Some non- listed exotics can create problems for native plants and habitats, and are a major hindrance for land managers who attempt to reintroduce fire into native landscapes. The list of non- native plants found at DEPO in the 2001 survey follows:

Common Name	Scientific name
bull thistle	Cirsium vulgare
	Lactuca serriola
common timothy	Phleum pratense
annual bluegrass	Poa annua
Kentucky bluegrass	Poa pratensis var. pratensis
	Spergularia rubra
dandilion	Taraxacum officinale
Goats beard	Tragopogon dubius

Since the 2001 survey, one additional non- native species, cheat grass (*Bromus tectorum*), has been detected in the monument. Cheat grass and wooly mullein (*Verbascum thapsus*) have been detected on Inyo National Forest lands near the monument's boundary.

Of these ten non- native species, six have the potential to produce adverse effects on native vegetation, according to a threat assessment conducted for Sequoia and Kings Canyon National Parks and Yosemite National Park (Gerlach et al. 2003). Gerlach et al. (2003) placed non- native plant taxa into four management categories:

Category 1: Currently restricted to a relatively small number of sites in each park and have either been shown to greatly affect native vegetation or have a high probability of causing serious impacts: *Tragopogon dubius*
Category 2: Restricted to a relatively small number of sites and generally have a lesser effect on native vegetation: *Phleum pretense*
Category 3: Broadly distributed in the parks, are apparently increasing their ranges within the parks, and have been shown to have a great impact on native vegetation: *Bromus tectorum*, *Poa pratensis* var. *pratensis*, *Cirsium vulgare*, and *Verbascum thapsus*.
Category 4: Low priority: Lactuca serriola, Poa annua, Spergularia rubra, Taraxacum officinale.

Two of these six invasive species, *Cirsium vulgare* and *Bromus tectorum*, appear to have the potential to be invasive in the monument. Numerous populations of *Cirsium vulgare*, each consisting of 5- 250 individuals, were encountered, especially in the area known as the Buttresses. One population of *Bromus tectorum*, located on a trailside near the Rainbow Falls overlook, is known in the monument. The majority of the other nonnative taxa were found near the ranger station in and around the meadows that are used for access to fishing.

Invasive plant management in the monument is conducted by the California Exotic Plant Management Team, an NPS rapid response- style team based out of Point Reyes National Seashore. The team travels to the monument for one 60- hour work period per year, during which it focuses on surveying for and controlling *Bromus tectorum* and *Cirsium vulgare*. Additional control is provided on a project- basis as funding becomes available.

Wilderness Resources
Approximately 90 percent (747 acres) of the monument and most of the National Forest land adjacent to the monument is designated wilderness. Wilderness plays a role in the overall health of ecosystems, by providing natural areas without roads or human residents, and valuable habitat for wildlife and plants. It is characterized by its outstanding opportunities for solitude, where people are visitors who do not remain.

Scenery and Recreation
Although visitation has been relatively stable at approximately 150,000 people per year since 2000, it is projected to grow as the town of Mammoth Lakes continues to evolve into a destination for summer recreation. Visitation patterns at the monument are changing, as families from the local area increasingly use the area for picnics and parties without visiting the falls or the Postpile itself.

Gateway Communities
The town of Mammoth Lakes and its associated ski area has long been a resort center offering winter accommodations for visitors to the nearby ski area. In recent years, the town has grown rapidly as a year- around resort destination. The nearby monument is a prominent attraction for summer visitors. Further expansion of tourist facilities at Mammoth Lakes can be expected to lead to increased visitation at the monument.

The Eastern Sierra of California offers open space, dramatic scenery, and a variety of recreational opportunities. The nearly two- hundred- mile- long corridor of Highway 395 from Lone Pine to the California- Nevada border is referred to as the Eastern Sierra Scenic Byway, and in many places is a designated California State Scenic Highway. The corridor embraces two counties (Inyo and Mono), three National Forests, BLM lands, and four NPS areas (Yosemite National Park, Devils Postpile National Monument, Manzanar National Historic Site, and Death Valley National Park). Ninety- six percent of the land is under public jurisdiction. The Los Angeles Department of Water and Power also owns a significant amount of undeveloped land that is managed as a water source for export to Los Angeles.

The economies of the Eastern Sierra communities are based largely on tourism. Mammoth Lakes is a ski town in transition to becoming an upscale, year- round resort catering to both residents and visitors. Bishop serves year- round visitors in the Inyo area who come for a variety of outdoor adventures. The economies of the other gateway communities (Lee Vining, June Lake, Crowley Lake, Tom's Place) are more traditionally- based on small family businesses. Populations expand dramatically during holidays and the summer. For example, the population of Mammoth ranges from 7,500 residents in the slow season to nearly 40,000 on a busy weekend.

Visitation to Devils Postpile National Monument affects – and is affected by – visitation to the Mammoth Lakes resort area. The Town of Mammoth Lakes and the Tourism Bureau actively promote the monument as a destination in their summer and shoulder season marketing to increase visitation to the town. The Town of Mammoth Lakes, long a resort center offering winter accommodations for visitors to the nearby ski area, has in recent years grown rapidly as a year- around resort destination, with the monument a prominent attraction for summer visitors. Further expansion of tourist facilities at Mammoth Lakes can be expected to lead to increased visitation at the monument.

ENVIRONMENTAL CONSEQUENCES

Methodology for Assessing Impacts

Impact Descriptions

Potential impacts are described in terms of:
Type – Are the effects beneficial or adverse?
Context – Are the effects site- specific, local, or regional?
Duration – Are the effects short- term, lasting less than one year, or long- term, lasting more than one year?
Intensity – Are the effects negligible, minor, moderate, or major? Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this environmental assessment.

Impairment

Park Service policy requires analysis of potential effects to determine whether or not actions would impair park resource*, (National Park Service Management Policies*, *2001)*. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made in the *Environmental Consequences* section for each impact topic.

Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.), require assessment of cumulative impacts in the decision- making process for federal projects. Cumulative
impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non- federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are analyzed for both of the alternatives.

Cumulative impacts were determined by combining the impacts of both Alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects in or near the monument.

Soils

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to soils were derived from available soils information, park staff's observations of the effects on soils from fire, and literature on fire ecology and effects. The thresholds of change for the intensity of impacts to soils are defined as follows:

Negligible: The impact is at the lowest level of detection and causes very little or no physical disturbance /removal, compaction, unnatural erosion, when compared with current conditions.

Minor: The impact is slight but detectable in some areas, with few perceptible effects of physical disturbance/removal compaction, or unnatural erosion of soils. Beneficial effects include measurable increases in soil nutrients in small, localized areas.

Moderate: The impact is readily apparent in some areas and has measurable effects of physical disturbance/removal, compaction, or unnatural erosion of soils. Beneficial effects include measurable increases in soil nutrients in several large areas.

Major: The impact is readily apparent in several areas and has severe effects of physical disturbance/removal, compaction, or unnatural erosion of soils. Beneficial effects include measurable increases in soil nutrients in a substantial portion of the park.

Impacts

Erosion responses to burning are a function of several factors. Some of these are: the extent to which protective cover is eliminated, steepness of slope, the degree to which the affected soil sheds water, climate, and rate of vegetation recovery (Tiedemann et al 1979, Wade 1989). Removal of vegetation and the underlying forest floor (duff) by fire and fire suppression activities expose mineral soil, reducing infiltration and water storage capacity and increasing runoff (Robichaud 1996 and 2000). Natural erosion would occur after fires in the absence of fire suppression, but widespread severe erosion caused by catastrophic fires resulting from long periods of fire suppression are considered unnatural. Erosion impacts from prescribed fire can also be considered unnatural, as they are human caused, but the extent of erosion due to prescribed fire should be similar to that which would occur under a natural fire regime.

Nitrogen is an important limiting nutrient in most forest ecosystems. Heat from fire can cause the mineralization of organic nitrogen, resulting in a short term (less than 1 year) increase in the nitrogen available for plants (Wan et al. 2001). Many short- lived forbs, grasses and woody plants capitalize on the flush of post- fire nitrogen and keep most of it in the system. However, volatilization of nitrogen, caused by soil heating during a wildfire can reduce the amount of nitrogen in the system. There is a gradual increase in nitrogen loss by volatilization as temperature increases (Knight 1966, White et al. 1973).

Alternative A would protect soils from erosion in the short term, but would leave them vulnerable to widespread erosion after large catastrophic fires. As the result of fire exclusion, monument- wide soil productivity would decline slightly as some nutrients become organically bound, primarily in woody species biomass. As a stand matures in the absence of fire, an increasing portion of the nutrients on the site become locked up in the vegetation and would be unavailable for further use until the plants die and decompose. Large hot fires would also result in a greater loss of nitrogen due to volatilization. When heavy concentrations of fuel burn during periods of high temperature and low fuel moistures, the heat per unit area may be elevated long enough to ignite organic matter in the soils and render the soils sterile for several years.

Prescribed fires under Alternative B would cause some erosion on steep slopes, however burning within prescription parameters would improve the chance that some duff would remain and mineral soil exposure would be patchy. This would reduce the amount of erosion and nutrient loss and ensure a source of seeds to re- colonize the area.
The low- intensity prescribed fires proposed in Alternative B would speed up the nutrient recycling process, returning nutrients back to the soil where they would be available to stimulate plant growth, restore surface herbaceous vegetation and increase site productivity. Soils would be better protected from the adverse effects of high- intensity fires by implementing the fuel management techniques proposed in this alternative.

Cumulative Impacts

The Inyo National Forest is increasing its use of prescribed fire. Its efforts, combined with Alternative B could have a cumulative net benefit to soils in the monument area.

Mitigation Measures

Prescriptions designed to reduce fire severity during prescribed fire operations would be followed. Existing roads and trails would be used to the greatest extent possible as control lines for both wildland and prescribed fires.

Tactics involving the use of handtools, which minimize the impacts to soil, would be employed to construct firelines, where appropriate. Fire management personnel would rehabilitate firelines after completing the operation to reduce soil loss through erosion.

Conclusion

Erosion is likely to occur as a consequence of either alternative. Implementing the prescribed burning program proposed in Alternative B would promote, low intensity surface fires, under a timber overstory. This would leave some litter and duff unburned and cause fewer changes to the structure of mineral soil than very hot, large fires.

Alternative A may lead to soil degradation because of the increased likelihood of large- scale, high intensity, wildland fires as fuel accumulates. Soil impacts from Alternative A would be adverse and moderate.

Alternative B would protect soil resources in the long- term by increasing available nutrients, reducing soil disturbance and reducing the adverse effects resulting from high intensity wildland fires. Overall effects on soils resulting from implementation of Alternative B would be beneficial and minor to moderate.

Impairment

No impairment to monument soil resources would be associated with the implementation of either alternative.

Air Quality

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to air quality were derived from Environmental Protection Agency (EPA) standards and smoke management guidelines of the National Wildfire Coordination Group (NWCG). The thresholds of change for the intensity of impacts to air quality are defined as follows:

Negligible: Impacts are not detectable, well below air quality standards, and within historical baseline air quality conditions.
Minor: Impacts are detectable but well within or below air quality standards and within historical baseline air quality conditions.
Moderate: Impacts are detectable, within or below air quality standards, but historical baseline air quality conditions are being altered on a short- term basis.
Major: Impacts are detectable and persistently alter historical baseline air quality conditions. Air quality standards are locally approached, equaled, or exceeded.

Impacts

The Environmental Protection Agency (EPA) recognizes that wildland fires of all kinds (wildfire, prescribed fires, etc.) contribute to regional haze, and there is a complex relationship between what is considered a natural source of fire and a human- caused source of fire. For example, the increased use of prescribed fire in some areas may lead to particulate emissions levels lower than those that would be expected from a catastrophic wildfire. Given that in many instances the purpose of prescribed fire is to restore the natural fire cycles to the forest ecosystems, EPA would work with state and federal land managers to support development of enhanced smoke management plans to minimize the effects of emissions on public health and welfare (EPA 1999). Smoke issues in Devils Postpile National Monument would be dealt with as outlined in the Smoke Management Plan (Appendix C of the companion *Fire and Fuels Management Plan*).

Secondary emissions are pollutants formed in the atmosphere by photochemical transformation of primary emissions. They include oxidants such as ozone, which is a criteria pollutant as defined by the EPA. The specific emission factors for secondary emissions from prescribed burning are unknown but are believed to be relatively small (Haddow 1989). For ozone to form, oxides of nitrogen (NOx) are required as well as volatile organic compounds (VOCs) emissions in the presence of sunlight. The amount of NOx and VOCs generated would be dependent on the types of fuel burned, the moisture content, and the temperature of the combustion process (USFS Technical Report 2002). Currently, readings taken at all air monitoring stations nearest the monument are meeting the National Ambient Air Quality Standards for ozone and PM10 (http://www.epa.gov/airnow/).

Alternative A would have the least short- term impact on air quality, because prescribed fire would not be used and all wildland fires would be suppressed, often within the first burning period. However, the absence of fire and the limited use of other fuel management techniques would result in heavy accumulations of fuels that would, if ignited, be difficult to suppress and would eventually lead to larger fires of longer duration. Fires of this type would be expected to impact air quality for extended periods of time. Both human health and visual standards would probably be affected for longer periods of time in the vicinity of the fire.

Alternative B would have a greater short- term impact on air quality due to the prescribed fire activity. When using prescribed fires on areas with light fuel loadings such as grasslands or frequently burned pine stands, total smoke production would be low because smoldering combustion is minimal in these fuel types (NWCG 1985). Visibility could be reduced for short periods of time in areas within the monument and the adjacent National Forest. Human health standards (National Ambient Air Quality Standards for particulate matter size class of 10 microns in diameter and smaller and particulate matter of 2.5 microns in diameter and smaller) could be approached for short periods in the area immediately adjacent to the fire. These effects would generally last less than a week, depending on the size of the fire, the fuels, and the environmental conditions present.

Air quality on a regional scale would not be affected because prescribed burns in the monument would not be large enough to produce significant amounts of nitrogen oxides (NOX), volatile organic compounds (VOCs), and particulate matter. Fires that were no longer in prescription would be extinguished. Under this alternative, the potential for air quality concerns over an extended period would be reduced because the likelihood of occurrence of large wildland fires would be reduced through proactive fuels management. Because prescribed burns can be scheduled, Alternative B would provide managers with the greatest flexibility to take advantage of favorable weather and atmospheric conditions and coordinate with other regional smoke producers to disperse smoke and avoid impacting sensitive areas. This would allow the distribution of emissions over time and space to avoid exceeding air quality standards.

Cumulative Impacts

As adjacent lands are developed and visitation to the monument and National Forest increases, the probability of human- caused ignitions also increases. A higher risk of ignition, coupled with the increasing fuel loads that would be present under Alternative A, could result in large landscape- scale wildland fires that would cross agency boundaries. Such overly large fires would result in increased emissions, reduced air quality, and increased health risks.

The Inyo National Forest is currently increasing its use of fire to achieve resource objectives. Smoke from these fires in addition to smoke from prescribed fires in the monument could have a cumulative impact on visitors and local communities.

Regional air quality during prescribed fire operations can be affected by weather; existing air quality; the size, timing, and duration of the activity; and other activities occurring in the same airshed when many acres are burned on the same day. Alternative B would provide flexibility to schedule burns and to coordinate with other regional smoke producers to take advantage of favorable conditions that are required to disperse smoke and avoid regional cumulative smoke impacts.

Mitigation Measures

Several methods are available to reduce the impacts to air quality including, (1) minimizing the area burned, (2) reducing the fuel loading in the area to be burned through mechanical pretreatment, (3) reducing the amount of fuel consumed by fire through the use of smaller burn units, and (4) minimizing emissions per ton of fuel consumed by burning under favorable conditions or using different firing techniques.

Prescribed burns would not be conducted under conditions where ambient levels of ozone are already determined to be unhealthy. Prescriptive elements in prescribed burn plans would specify the proper conditions necessary to increase smoke dispersal and enhance burning, thereby reducing impacts from smoke.

Under the Clean Air Act, the Park Service is responsible for protecting air quality within monument boundaries. The Park Service must also take appropriate action to do so, when reviewing emission sources both within and in proximity to the monument (Malkin 1994, Clean Air Act, as amended). Therefore, all prescribed burns would be conducted in accordance with regulations established by the State of California and the Clean Air Act and the Smoke Management Plan.

Conclusion

The adverse air quality impacts associated with Alternative A, in the short term, would be negligible. In the long term, there would be the potential for high intensity, long duration fires resulting from excessive fuel loading. Therefore, adverse long- term impacts would be moderate.

In the short term, Alternative B would include more fires and more smoke impacts than Alternative A. Adverse short- term impacts from Alternative B would be minor. In the long term, Alternative B would result in fewer high- intensity, long- duration fires, so adverse impacts would be minor.

Impairment

No impairment to monument air resources would be associated with the implementation of either alternative.

Water Quality

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to water quality were derived from park staff's observations of the effects of fire on water quality and from literature on fire ecology and effects. The thresholds of change for the intensity of impacts to water quality are defined as follows:

Negligible: Impacts are not detectable, well below water quality standards, and within historical baseline water quality conditions.

Minor: Impacts are detectable but well within or below water quality standards and within historical baseline water quality conditions.

Moderate: Impacts are detectable, within or below water quality standards, but historical baseline water quality conditions are being altered on a short- term basis.

Major: Impacts are detectable and persistently alter historical baseline water quality conditions. Water quality standards are locally approached, equaled, or exceeded.

Impacts

When surface run- off increases after a fire, the run- off may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams impacting water quality (Wade1989). Contamination of tributaries from chemical fire retardant dropped from the air tankers of assisting agencies during wildland fire suppression is a possibility. In general, the retardant chemicals are composed of ammonium salts with a thickening agent, such as ammonium sulfate or ammonium polyphosphate with an attapulgite clay thickener, or diammonium phosphate with a guar gum- derivative thickener (Gaikowski 1996). Sequoia and Kings Canyon National Parks only purchases and uses the foam fire suppressant Phos- Chek WD- 881, which is used by engine crews. It is a proprietary mixture of anionic surfactants, foam stabilizers, and solvents including hexylene glycol (Hamilton et al. 1998). When Phos- Chek WD- 881 is introduced to natural water systems, current research has found measurable effects of toxicity to aquatic invertebrates, including *Daphnia magna* (McDonald et al. 1996) and *Hyalella azteca* (McDonald et al. 1997), and early life stages of rainbow trout (Gaikowski et al. 1996). Fire retardant drops and use of foam fire suppressants during suppression actions would avoid wetlands and watercourses to the maximum extent possible.

Large fires, resulting from Alternative A and occurring on steep slopes, or where conditions are drier, could contribute to the total consumption of the litter and protective duff. Firelines constructed on slopes greater than 25 percent would produce the same result, but on a much smaller scale. The resulting loss of protective duff layers would increase the likelihood of sedimentation and increased water turbidity, the most dramatic and important water quality responses associated with fire (Tiedemann et al 1979). Use of fire retardant would be more likely during suppression of large catastrophic fires than it would for suppression of smaller fires with less fuel loading. Fires that remove overhead protective vegetation in riparian areas would also increase stream temperatures following the fire (Tiedemann et al. 1979), which would impact in-stream biota that have a low tolerance for warm water, including cold water fish species such as salmonids (Clark 1994).

Prescribed fire operations, especially those which involve fireline construction on steep slopes, may have the same impacts on water quality as those described under suppression operations. However, depending on the objectives identified for the area, prescribed burns would use existing human- made and natural barriers. They would be conducted under conditions that would allow some residual duff to be retained to reduce soil erosion and the resulting impact to water quality. Prescribed fires would not cause significant removal of overhead protective vegetation in riparian areas, if streamside vegetation in the burned area is protected. This would minimize increases to stream water temperatures following the fire, which would have less impact on organisms with low tolerance for warm water (Clark 1994).

Under Alternative B, using a combination of mechanical treatments and prescribed fire, the fire personnel would selectively treat areas prone to high intensity fires under controlled conditions. The proactive nature of this alternative would reduce the likelihood of large, high intensity fires that have the greatest potential for causing damage to water resources (Tiedemann et al 1979) or that require the use of fire retardant and/or fire suppressant foams. This alternative provides an effective means of insuring that some protective groundcover would be retained, reducing the volume of sediment that is introduced in to the river. Alternative B also would minimize increases to water temperatures in streams within burn areas after fires, thereby minimizing temperature- related impacts to in- stream biota.

Cumulative Impacts

Large, intense wildland fires, associated with Alternative A, would most likely involve large portions of the drainage on the Inyo National Forest, and could increase the possibility of sedimentation, increased water temperature, and toxicity to aquatic biota in the San Joaquin watershed. This could result in moderate, adverse cumulative impacts to water quality.

Mitigation Measures

In addition to the measures identified in the soils section, whenever possible, vegetation adjacent to streams and other water courses would be protected. The vegetation should sufficiently slow the flow of any run- off to permit debris and soil to be deposited before it could reach a stream or river. Site specific mitigation measures would be included in prescribed burn plans when appropriate. Activities would be coordinated with neighboring landowners and agencies to avoid impacting a specific watershed.

Chemical fire retardant would be used sparingly and with maximum regard for aquatic life. Retardant use is highly discouraged near significant streams, the Middle Fork of the San Joaquin River or major tributaries. The potential area of spread for the fire would be analyzed by Resource Management staff and recommendations made for which streams may be impacted if tactically required to cross any stream with retardants. The Resource Advisor assigned to the fire will be consulted about the use of fire retardant within the monument. This consultation would occur on a daily basis to stay abreast of fire spread and potential impacts. Despite this stipulation, there is recognition that retardant and/or foam may be released into tributary streams during fire suppression, especially on large fires.

Conclusion

Under Alternative A, there would be no short term adverse impacts to water quality. In the long term a catastrophic wildfire could lead to sedimentation, turbidity and increased water temperatures in the river. These effects, combined with the possibility of the need for chemical retardant and/or fire suppressant foams to control these high intensity wildfires, would lead to moderate adverse impacts to water quality and aquatic biota.

Under Alternative B, there would be a lower frequency of high intensity fires, better protection of ground vegetation, less soil erosion in the long term, and minimized water temperature increases. Implementation of alternative B would rely less on chemical retardant and/or fire suppressant foams than would implementation of Alternative A. The adverse water quality impacts from this alternative would be minor to moderate.

Impairment

No impairment to water resources would result from the implementation of either alternative.

Vegetation

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to vegetation were derived from park staff's observations of the effects of fire on vegetation and from literature on fire ecology and vegetation effects. The thresholds of change for the intensity of impacts to vegetation are defined as follows. Impacts can be beneficial or adverse:

Negligible: Impacts occur, but are not conspicuous except for superficial consumption of surface litter. Effects on individual plants, plant populations, or functional processes are not observable. Disturbance does not result in changes to plant community structure or composition.

Minor: Impacts are detectable. Forest floor is consumed, and some mineral soil is exposed. Damage to individual plants is restricted to herbs and small shrubs and does not affect below-ground plant structures. Changes in community structure and composition are restricted to the herbaceous and low- shrub layer. Post- disturbance plant communities quickly return to pre-disturbance conditions.

Moderate: Impacts are apparent. Forest floor is partially consumed, but patches of litter and duff remain to provide a seedbank for regeneration. Damage to aboveground structures is extensive for herbs, shrubs, saplings, and some fire- intolerant trees. Significant changes in plant community structure and composition occur in the understory and midstory. Post- disturbance plant communities retain many characteristics of pre- disturbance communities, but differences persist for several years.

Major: Impacts are obvious without close inspection. All or nearly all of the forest floor and vegetation is severely impacted. Forest floor, herbs, shrubs, saplings, midstory trees, and many overstory trees are consumed. Plant damage extends to below- ground structures (e.g., roots). Changes in community structure include all vegetation strata. Changes in species composition are dramatic because of species loss and invasion of new species. Pos- disturbance plant communities may not resemble pre- disturbance communities even after several years or decades.

Impacts

Fire has been instrumental in shaping plant communities in the Sierra Nevada. Most low and mid- elevation plant communities are fire adapted. Fire may injure or kill part of a plant or the entire plant, depending on how intensely the fire burns and how long the plant is exposed to high temperatures. Plants that are not fire adapted are more susceptible to damage from fire, as are small trees of any species. Fire causes top- killing of shrubs, and fire scars could make certain tree species more susceptible to disease. The long- term absence of fire would favor more shade tolerant species, heavier fuel loading, and a less fire- tolerant vegetation structure. Succession would proceed toward a dense forest rather than the fire- maintained open forest with sparse, large trees that is seen in photos taken by early explorers and settlers to the area.

Under Alternative A, the lack of fire in the ecosystem would continue the successional trend away from a fire- adapted forest structure to a forest intolerant of fire and susceptible to catastrophic fire. Competition among trees in dense stands leads to stressed trees, which are more vulnerable to insect infestations and are less able to resist the attacks. Large scale, high-intensity wildfire could result in complete stand replacement, without live trees to provide a seed source. The shrub dominated plant communities, which became established after the

Rainbow fire, are different in structure and relative composition from the forests that they replaced. If these shrub communities are unmanaged they would most likely become susceptible to re- burning and the ensuing wildfires could kill the few tree seedlings that have become established since the fire.

Under Alternative B, prescribed fire and mechanical fuel reduction could be used to reduce understory vegetation and ladder fuels, and limit the potential for crown fires. Prescribed fire in the unburned portion of the monument would tend to promote a more natural forest composition and structure with enhanced tree vigor and more open spacing, which would reduce the risk of insect infestations. Areas which burned hottest in the Rainbow fire could start returning to an open forest that is resistant to high intensity wildfire. Initially, under Alternative B, accumulations of fuel may actually increase during the restoration phase due to the death of smaller trees, the top- killing of shrubs by prescribed fire and the debris resulting from mechanical fuel reduction. In the long term, fuel loading would be decreased and the forest structure could, in time, return to a state that is more or less similar to that which was present prior to Euroamerican settlement.

Cumulative Impacts

The prescribed burning program that is currently being implemented in the Inyo National Forest would interact with the implementation of Alternative B to create a positive cumulative benefit to vegetation in the region. Landscape level habitat diversity would be maintained or increased.

The possibility of a large catastrophic fire and subsequent insect infestations under Alternative A could have a major adverse cumulative impact to vegetation.

Mitigation Measures

Prescribed burning has direct and indirect effects on the environment. Proper use of prescribed fire and evaluation of the benefits and costs of a burn require knowledge of the manner in which fire affects vegetation. Prescribed burns would be implemented with appropriate consideration given to the historical role of fire and the potential impacts of its reintroduction to a given biotic (or plant) community. The intensity and frequency of fire in a given plant community would be controlled to meet resource objectives. Prescribed burns would be timed to achieve maximum benefits to a target species or biotic community and minimize adverse environmental effects.

Conclusion

Alternative A, by attempting to exclude fire as a natural process, would leave both the burned and unburned portions of the monument susceptible to intense wildfires. Loss of fire resistant communities and forest structure would result in diminished habitat (qualitatively and spatially) for plants and animals. This would be a moderate adverse impact, but would probably not constitute an impairment of the park's vegetation and wildlife habitat.

Increased fire use in Alternative B would restore a more natural vegetative composition and structure in areas where fire has been excluded. Prescribed fires in the post burn area could be managed to reduce fuel accumulations and allow for survival and regeneration of some trees. Impacts from this alternative would be beneficial and moderate to major. Resource managers would critically evaluate the success of proposed burning under this alternative and subsequently fine- tune management prescriptions to achieve resource objectives (e.g., hazard fuel reduction and species conservation).

Impairment

No impairment to the monuments vegetation resources would be associated with the implementation of either alternative.

Wildlife

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to wildlife were derived from park staff's observations of the effects of fire on wildlife and from literature on fire ecology and wildlife effects. The thresholds of change for the intensity of impacts to wildlife are defined as follows. Impacts can be beneficial or adverse:

Negligible: Impacts occur, but are so minute that they have no observable effect on individuals, populations, or the ecosystems supporting them. Impacts result in fluctuations of environmental and species variables that are well within the natural range of variability.

Minor: Impacts are detectable, but fluctuations of environmental and species variables are not expected to be outside the natural range of variability and are not expected to have long- term effects on populations or the ecosystems that support them. Long- term effects could occur to individuals. Population numbers for common species may have small, short- term changes. Rare species remain stable even in the short- term.

Moderate: Impacts are detectable and fluctuations of environmental and species variables are expected to be outside the natural range of variability for short periods of time. Changes within the natural range of variability may be long- term. Population numbers for common species may experience small to medium, short term changes. Rare species may experience short- term changes.

Major: Impacts are detectable and fluctuations of environmental and species variables are expected to be outside the natural range of variability for short to long periods of time, or even be permanent. Population numbers for common species may experience large, short- term changes with long- term population numbers substantially altered. Rare species may also experience long- term changes. In extreme cases, species may be extirpated from the park and key ecosystem processes may be disrupted.

Impacts

The direct effects of fire on wildlife include injury, death, or displacement during the fire itself and/or human activities during staging or suppression. Examples of indirect effects of fire include changes in habitat, such as cover and availability of food species. Long- term removal of fire has only indirect effects, such as the lowering of habitat diversity. Periodic fire tends to favor understory species that require more open habitat. The loss of a specific post- fire successional stage may correlate with the decline of those species dependent on a particular vegetation type. The maintenance of a mosaic of all successional stages through positive management should promote habitat for all potential species in an area.

Alternative A might be beneficial, in the short- term for a few wildlife species because it would preserve the *status quo*. Over the long term, a full suppression policy may increase adverse effects on wildlife. Full suppression would reduce habitat diversity and increase the probability of high- intensity, stand altering fire, which, by extension, would alter both the monument's species richness and heterogeneity. The long- term lack of fire has unintended ecological effects which can lead to habitat loss, for both rare and common species, and/or a vegetation type conversion (EPA 1998). Many plant and animal species may be declining because they require fire- dependent habitats that haven't burned in decades (EPA 1998).

Under Alternative B, there may be short- term negative effects from wildland fire on a wide variety of wildlife species. Effects include: limited mortality, loss of food sources, and the loss of protective cover (Lyon et al. 1978). The most significant effects on fauna that could result from implementation of Alternative B are changes in the environment and habitat structure, most immediately manifested in differences in forage and cover, in contrast to direct mortality that results from prescribed fire activities (Shortess 1986).

A post burn increase in small mammals would benefit those animal and bird species that rely on them for food. All species would benefit from long- term maintenance of fire dependent habitats. Little is known about the reptile and amphibian populations that inhabit the monument and the effect fire or the absence of fire would have on them on a long- term basis. Western fence lizards in chaparral take refuge under surface objects at the time of fire; after the fire, they invade the burned site from unburned patches (Lillywhite and North 1974).

Cumulative Impacts

The prescribed burning program, which is being implemented in the Inyo National Forest, would interact with Alternative B to create a positive cumulative benefit to wildlife in the region.

Mitigation Measures

Care would be taken to avoid burning during sensitive periods, for example, prior to fledging of ground nesting birds. Additional protection would be afforded to sensitive species (see Special Status Species).

Conclusion

Alternative A would allow the decline of fire- adapted conifer ecosystems in the monument. This would be a moderate, adverse impact to wildlife that depends on these ecosystems. Moderate beneficial effects would accrue to certain other species that depend on mature forest habitat.

Alternative B would restore ecosystems in areas where fire has been excluded. Impacts from this alternative would be beneficial and moderate for wildlife.

Impairment

No impairment to wildlife resources would be associated with the implementation of either alternative.

Special Status Species

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to threatened and endangered species were derived from park staff's observations of the effects of fire and from literature on fire ecology. The thresholds of change for the intensity of impacts to threatened and endangered species are defined as follows. Impacts can be beneficial or adverse:

Negligible: An action that could result in a change to a population or individuals of a species or a resource, but the change would be so small that it would not be of any measurable or perceptible consequence.
Minor: An action that could result in a change to a population or individuals of a species or a resource. The change would be small and localized and of little consequence.
Moderate: An action that would result in some change to a population or individuals of a species or resource. The change would be measurable and of consequence to the species or resource but more localized.
Major: An action that would have a noticeable change to a population or individuals of a species or resource. The change would be measurable and result in a severely adverse or exceptionally beneficial impact, and possible permanent consequence, upon the species or resource.

Impacts

The effect of wildland fire on rare and endangered plants and animals is not fully known. Empirical data on rare species' responses to fire are generally lacking and this holds true for most of the rare, threatened, and endangered flora and fauna that occur in the monument. Fire managers and resource specialists recognize that a population's actual response at a given time and site may differ from the predicted response for that species. Fire characteristics, vegetation type, site conditions, and post- fire weather are among the determinants of population response to individual fires (Brown and Smith 2000).

Most special status species live in specific and limited habitats. The writing of fire prescriptions that are consistent with pre- Euroamerican fire regimes for the vegetation types and associated habitats that occur in the monument would reduce the likelihood of adverse impacts to rare plants and animals. It is assumed that a species which lives in a specific vegetation type is adapted to fire regimes which historically occurred in that type of vegetation.

By adhering to existing NPS policies and following established protocol, very few potential impacts to federally and state- listed species would occur under either alternative.

Of the three plant species of concern found in the monument two, *Cinna bolanderi* and *Mimulus laciniatus,* grow in wet habitats that are unlikely to be impacted by wildfire or prescribed fire. The third, *Hulsea brevifolia,* was abundant in the recently burned portion of the monument, so it may have a positive response to fire. None of these species are addressed in the Fire Effects Information System database. (Karen Webster: http://www.fs.fed.us/database/feis/, accessed March 31, 2004)

The animal species of concern that live in combustible habitats include American martin, California spotted owl, long- eared owl, great grey owl, goshawk, Cooper's hawk, black swift, hermit warbler, yellow warbler, and all of the sensitive bats. These are the sensitive species that would most likely be affected by the fire program. Some of these species may suffer short- term losses, but they all live in habitats that depend on fire for long- term maintenance of their habitat. The willow flycatcher lives in meadow and riparian environments that are less likely to be effected by fire, but they are surrounded by fire- prone habitats. In spite of this, fire is unlikely to have a long- term detrimental impact on that species. Bald eagle and osprey, are rare visitors to the monument and unlikely to be effected by the fire program. Golden eagles may benefit from fire, which restores or maintains their habitat in a suitable condition that enhances the prey base and hunting efficiency. Prescribed or natural fire could also result in either loss or protection of potential nest trees and perches.

By suppressing fire, Alternative A would perpetuate the decline of habitat favored by species that benefit from periodic fire and would lead to accumulations of fuels resulting, ultimately, in the possibility of large scale, high intensity wildland fires. Fires of this type would constitute an increased risk to many species by consuming duff and mineral soils that may harbor remnant plants and seeds, or stress and destroy rhizomes of plants, thus reducing, or even eliminating, the possibility of regeneration and perpetuation.

Moderate fires are necessary to reduce encroachment of competitive species and release nutrients to stimulate growth. Based on current knowledge, Alternative B best protects these species in the long- term because that alternative would reduce threats from large scale, high intensity wildland fire and create favorable habitats, consistent with known ecological conditions required by some listed species. Area resource managers would be consulted prior to conducting a prescribed burn to determine the presence or absence of these species and formulate a plan to protect populations from unwanted fire effects. After the completion of additional fire ecology studies, resource managers would have a more complete understanding of the ecology of the area and the impact of wildland fires on many more species. This would allow them to better determine overall ecological relationships.

The use of prescribed fire is expected to benefit aquatic habitat indirectly by maintaining the natural processes in the watershed including movement of nutrients and sediments and maintaining natural levels of evapotransporation. It could have temporary adverse effects such as causing an increase in turbidity and sedimentation. Riparian zone (streamside) vegetation would normally be excluded from prescribed burns. Riparian zones would also be protected whenever possible from the impacts of wildfire.

Cumulative Impacts

There are no known or reasonably foreseeable cumulative impacts to special status species in the monument from either alternative.

Mitigation Measures

Known locations of sensitive species would be considered during wildland fire suppression operations unless it is known that fire enhances a particular species. All known listed species in a burn unit would be evaluated prior to a prescribed burn and protected as specified in the prescribed burn plan. All such measures would be identified in prescribed burn plans and in a site- specific, pre- attack wildland fire suppression plan.

Conclusion

Under Alternative A, impacts to species of concern would be minor due to continued degradation of terrestrial habitats. Under Alternative B, there would be moderate, beneficial impacts to sensitive animals and plant species of concern

Impairment

No impairment to the monument's threatened, endangered species or species of concern would be associated with either alternative.

Invasive Non-native Plants

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to aggressively invasive weeds were derived from park staff's observations of the effects of fire on invasive plants and from literature on fire ecology and invasive plant effects. The thresholds of change for the intensity of impacts to invasive plants are defined as follows:

Negligible. No or barely detectable increases in the number of non- native species and extent of their range. Effects short- term and limited to a small area and not measurable.
Minor. Changes in the extent of non- native species domination are short- term, localized, and measurable to one or more species. Mitigation of effects would be simple and effective.
Moderate. Less than half of fire management activity treatment areas would be colonized by invasive non- native species over a relatively long period of time. Mitigation would be extensive, but most likely successful in eliminating and/or controlling their spread.
Major. More than half of fire management activity treatment areas would be colonized by invasive non- native species over an extended period of time. Mitigation would be extensive, but its success is not assured.

Impacts

Fire, especially high- intensity fire, is known to promote the establishment and spread of several of the invasive non- native species present in the monument (Harrod and Reichard 2001). Reintroduction of fire has the potential to increase non- native plant cover, especially after higher intensity fires (Keeley 2001). *Cirsium vulgare* (bull thistle) and *Bromus tectorum* (cheat grass) are the species of greatest concern. Harrod and Reichard (2001) note that *Cirsium vulgare* and *Tragopogon dubius* tend to increase in cover and frequency after fire in boreal and temperate western coniferous forests. Following prescribed fires in the early 1990's in the Grant Grove area of Sequoia and Kings Canyon National Parks, bull thistle spread widely. From 2001 to 2003, park crews removed approximately 365,000 bull thistle plants from 214 acres in the Grant Grove area (Athena Demetry, personal communication). The abundance of bull thistle in Grant Grove before the 1990's burns is unknown, but population density and cover were probably much higher than at present.

Cheat grass invades and proliferates after fire and also influences the fire regime, causing larger, hotter, and more frequent fires (Harrod and Reichard 2001). In Sequoia and Kings Canyon National Parks, managers are learning more about the behavior of cheat grass in a Sierran fire regime from a research study on the floor of Kings Canyon. Prior to the reintroduction of fire in the mid 1980s, cheat grass was present in sparse patches in Cedar Grove, as documented by plant collections in 1958 and 1968 (McGinnis et al. 2003). By the late 1990s, cheat grass had dramatically expanded its range and abundance in response to the reintroduction of fire (Caprio et al. 1998). The expansion of cheat grass was so alarming that fire management staff suspended fire operations. Managers are particularly troubled by the observation that cheat grass predictably invades forest patches that have burned with high intensity. The resulting gaps are otherwise often the only sites where pines have successful seedling recruitment. Evidence suggests that these gaps require fire- free conditions for two to three decades for successful pine recruitment. Thus, cheat grass may have long- term impacts on forest dynamics, as a consequence of direct competition with tree seedlings and by increasing fire frequency (McGinnis et al. 2003).

In 2001, the USGS- BRD began to study the cheat grass problem in Cedar Grove using intensive field experiments to monitor changes in cheat grass productivity relative to fire timing and intensity, nitrogen, phosphorous, shade, seed availability, and pine litter. Their results have not provided a cultural prescription for reducing cheat grass on a large scale, other than continuing to exclude fire. The USGS is continuing its study by testing direct control methods such as herbicides and mulching.

By suppressing fires, Alternative A would minimize the threat of fire- related establishment and spread of invasive plants over the short term. However, fire suppression increases the threat of larger, higher intensity wildfires over the long term. High- intensity wildfires would be more likely than prescribed fires, which generally burn at lower intensities, to cause rapid establishment and spread of invasive plants. Although larger fires, such as typical wildfires, may reduce invasion by increasing the distance from non- native seed sources to the bulk of the burn (Keeley 2001), their unpredictability and large size make pre- and post- fire surveys for invasive plants more difficult to plan than prescribed fires.

Under Alternative B, prescribed fires may promote the establishment and spread of invasive plants within the burn unit.

Cumulative Impacts

Invasive plants present on adjoining Inyo National Forest lands could add cumulatively to the threat of non- native plant invasion after management fires. Stock passing through the monument from the Reds Meadow Pack Station may provide a source of new propagules after fire.

Mitigation Measures

There is a risk that prescribed fire would cause the establishment and spread of invasive plants. The risk can be minimized by managing the location and timing of fires and the presence of seed sources. Prescribed fires would be planned to avoid known locations of cheat grass populations. Because bull thistle is more widespread in the monument, absolute avoidance may not be possible. However, planned fire locations would be compared with known bull thistle locations so that pre- and post- fire invasive plant control could be administered to affected burn units. The risk that the close proximity of stock to a prescribed burn unit would provide a source of non- native plant seed would be minimized by the use of California certified weed- free feed by the Reds Meadow Pack Station. Region 5 of the U.S. Forest Service, which includes Inyo

National Forest, is in the process of drawing up regulations to require use of California certified weed- free feed by all users and pack stations (Nelson, 2003).

Conclusion

Under Alternative A, the threat of invasive species establishment and spread would be negligible to minor in the short- term absence of prescribed fire or wildfire. However, the long- term risk of wildfire would increase under this Alternative and the threat of invasive species establishment and spread in a wildfire scenario would be moderate to major. Under Alternative B, the threat of invasive species establishment would be minor to moderate under the use of prescribed fire, if mitigation measures are implemented. The long- term risk of wildfire would decrease under this alternative.

Impairment

No impairment to the monument's resources caused by invasive non- native plants would be caused by either alternative.

Wilderness

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to wilderness were derived from other Park Service documents and park staff's observations of the effects of fire on wilderness resources and wilderness experience. The thresholds of change for the intensity of impacts to wilderness are defined as follows. Impacts can be beneficial or adverse:

Negligible. A change in the wilderness character or resources could occur, but it would be so small that it would be neither measurable nor perceptible consequence.
Minor. A change in the wilderness character or resources and associated values would occur, but it would be small and, if measurable, highly localized.
Moderate. A change in the wilderness character or resources would occur. It would be measurable, but localized.
Major. A noticeable change in the wilderness character or resources and associated values would occur. It would be measurable, and would have a substantial or possibly permanent consequence

Impacts

Fire impacts to Wilderness character would result from any use of motorized equipment and motor vehicles (including mechanical transportation or landing of aircraft) during fire operations as well as any perceptible impacts to the appearance and primeval nature of the landscape. Natural and cultural resource impacts to Wilderness are discussed separately in other sections.

Under Alternative A, motorized equipment and motor vehicles would be used in the Wilderness, as necessary, to suppress wildland fires. The long term impact would be a divergence of the landscape from its natural and primeval state and toward an unnaturally dense forest with diminished vegetation and wildlife diversity. Under Alternative A, the forest would also be vulnerable to high intensity, large scale wildfires which would require greater use of motorized equipment and motor vehicles in order to protect monument infrastructure neighboring property and lands. There could be negative ecological impacts from this type of fire as well. High tree mortality could lead to long- term changes in vegetative composition when compared to pre- Euroamerican conditions.

Under Alternative B suppression activities would be the same as in Alternative A, and there would be additional crews in the monument preparing for and conducting prescribed fire in the wilderness. Motorized equipment would not be used in the wilderness, but it is possible that the noise from such equipment would be audible in some parts of the Wilderness. Long term beneficial effects would be a slow return to a more natural forest habitats and an increase in species diversity. There would also be less chance of large fires, which require many crews and helicopters.

Cumulative Impacts

There are no known or foreseeable impacts to wilderness which would cause cumulative impacts for either alternative.

Mitigation Measures

Minimum Impact Suppression Techniques (MIST) would be used for all fire suppression activities in the monument (Appendix D of the companion *Fire and Fuels Management Plan*). A balance would be maintained between suppression objectives and resource protection. For example, instead of making a frontal attack on a fire, which would require a 5- foot wide fire line and bucket drops by helicopter, managers could choose to flank the fire and push it into a river or other natural barrier. The fire might burn more acreage, but the overall impact would be lower in comparison to the impact created by a direct attack. Any non- emergency actions, such as prescribed fire and mechanical fuel treatments, which are performed in wilderness, will undergo a thorough Minimum Tool analysis to ensure that the use of motorized equipment and/or aircraft landing is essential for wilderness and required to safely accomplish the project and the effects of these actions are minimized to ensure the quality of wilderness character and experience is maintained. The Minimum Tool analysis will conform to the process in use at Sequoia & Kings Canyon National Parks.

Conclusion

Under Alternative A, short term impacts would be moderate and adverse, long term impacts would be moderate and adverse. Short term impacts to wilderness resulting from the implementation of Alternative B would be minor and adverse. Long term impacts would be minor and beneficial.

Impairment

No impairment to Wilderness character or resources would be associated with the implementation of either alternative.

Scenery and Recreation

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to visitor use were derived from park staff's observations of the effects of fire on visitor use. The thresholds of change for the intensity of impacts are defined as follows:

Negligible: The impact is barely detectable, and/or would affect few visitors. Any effects would be considered slight and short- term.
Minor: The impact to scenery or recreational opportunities is slight but would be detectable to some visitors, they would be localized and would not affect landscape character or important viewpoints
Moderate: The impact is readily apparent and long term and/or would affect many visitors, but would not result in substantial changes to landscape character, important scenic viewpoints or the specific recreational resources for which an area was established.
Major: The impact to visual resources or recreation is readily apparent to a large number of visitors, long- term, and result in substantial changes to landscape character or important scenic viewpoints. There could be substantial consequence, like the loss or gain of a recreational opportunity.

Short Term Impacts

Under both alternatives, visitors may be impacted by low to moderate concentrations of smoke, and certain areas of the monument may be temporarily closed for visitor safety.

Long Term Impacts

Alternative A would have little impact on visitor use except for large wildland fires, when large sections of the monument would have to be closed for extended periods. Under Alternative B, short- term restrictions would continue repeatedly when fuels projects were occurring. However, many of these restrictions would involve remote sections of the monument.

Cumulative Impacts

There are no known cumulative impacts to visitor use from either alternative.

Mitigation Measures

When, during wildland fire suppression operations and prescribed fire operations, administrative closure of an area is necessary to provide for visitor protection, all affected trailheads would be signed so that closures would be easily recognized. Safety measures to ensure visitor safety include posting traffic warning signs and public notices and would be identified in the prescribed burn plan. Interpretative programs would be presented, when appropriate, to better inform the public of the role of fire in the ecosystem and explain the ways in which fire can be used to accomplish management objectives. The monument would work with adjacent landowners and the Forest Service to coordinate activities so that the visiting public would be impacted as little as possible.

Conclusion
Under Alternative A, due to the higher risk of a catastrophic fire, adverse impacts would be moderate. Adverse impacts to visitor use resulting from the implementation of Alternative B would be negligible.

Impairment
No impairment to scenic or recreational values would be associated with the implementation of either alternative.

Gateway Communities

Methodology and Intensity Thresholds
Analyses of the potential intensity of impacts to gateway communities were derived from park staff's observations of the effects of fire on gateway communities (defined in "Affected Environment" section of this document). The thresholds of change for the intensity of impacts are defined as follows:

Negligible: The impact is barely detectable, and/or would affect few gateway communities. Any effects would be considered slight and short- term.
Minor: The impact is slight but would be detectable in some gateway communities. The impacts would be localized and short- term.
Moderate: The impact is readily apparent and long term and/or would affect many gateway communities, but would not result in substantial changes to the economy.
Major: The impact is readily apparent to a large number of gateway communities, long- term, and results in substantial changes to the economy. There could be substantial consequence, like the loss or gain of a major business.

Short Term Impacts
Under both alternatives, residents of the gateway communities may be impacted by very infrequent low to moderate concentrations of smoke. Under both alternatives, there would be little economic impact on gateway communities except for large wildland fires. During large fires, large sections of the monument would have to be closed for short periods. This temporary reduction in visitation would often be accompanied by an increase in firefighters and associated economic activity.

Long Term Impacts
No long- term impacts to gateway communities are expected from either alternative.

Cumulative Impacts
There are no known cumulative impacts to gateway communities from either alternative.

Mitigation Measures
Interpretative programs would be presented, when appropriate, to better inform the public of the role of fire in the ecosystem and the ways in which fire can be used to accomplish

management objectives. The monument would work with the Forest Service to coordinate activities so that the gateway communities would be impacted as little as possible.

Conclusion

Under Alternative A, due to the higher risk of a catastrophic fire, adverse impacts would be moderate. Adverse impacts to gateway communities resulting from the implementation of Alternative B would be negligible.

Consultation and Coordination

William Kaage – Fire Management Officer, Sequoia & Kings Canyon National Parks (SEKI)
Jody Lyle – Fire Information and Education Specialist (SEKI)
John Austin – Natural Resources Specialist (SEKI)
Benjamin Jacobs – Fuels Specialist (SEKI)
Harold Werner – Wildlife Biologist (SEKI)
Sylvia Haultain – Plant Ecologist (SEKI)
Thomas L. Burge – Archeologist (SEKI)
Gregg Fauth – Wilderness Coordinator (SEKI)
Catie Karplus – Technical Writer (SEKI)
Carl Douhan – Technical Writer of the Big South Fork NRRA Fire Management Plan EA

Other Agencies to be Consulted:

U.S. Forest Service
Inyo National Forest
Fire Management Staff
351 Pacu Lane, Suite 200
Bishop, CA 93514

U.S. Fish and Wildlife Service
Endangered Species Division
2800 Cottage Way, Room W- 2605
Sacramento, CA 95825

State Historic Preservation Officer
Office of Historic Preservation
California Department of Parks and Recreation
Milford Wayne Donaldson FAIA
1416 9th St. Room 1442- 7
Sacramento, CA 95814

San Joaquin Valley Unified Air Pollution Control District
1990 Gettysburg Ave.
Fresno, CA 93726- 0244

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